Remarks

I. The Drawings

A replacement Sheet 1 of the Drawings is enclosed, in which FIG. 1 has been amended so that first light beam 50 has been replaced with first light beam 10, second light beam 54 has been replaced with second light beam 14, and third light beam 60 has been replaced with third light beam 12.

Applicant thanks the Examiner for his attention to detail in discovering the typographical errors that have been corrected with the Amendment to the Drawings.

II. The Specification

Paragraphs [0016], [0020], [0021] and [0022] have been amended as shown.

Applicant thanks the Examiner for his attention to detail in discovering the typographical errors that have been corrected with the Amendment to the Specification.

III. The Claims

A. Claim 4 has been amended and new claims 5-20 have been added. Since the total number of claims and the number of independent claims are not more than that originally paid for, no fee is necessary to pay for the new claims. Applicant thanks the Examiner for his attention to the claims.

B. 35 USC 103

The Office Action rejects claims 1-4 under 35 USC 103(a) as being unpatentable over U.S. Patent Application 2002/0097953 to Jin et al. in view of U.S. Patent No. 6,445,495 to Walker et al. The Office Action states:

> Jin et al. teach (see Figs 2 and 10) a device (20/158, 154a, 154b) (see Paragraph 0059, lines 6-8) comprising a substrate (24), at least one optical amplifier (154a, 154b), a plurality of mirrors (25) attached to the substrate and moveable relative to the substrate independent of each other (see Paragraph 0024, lines 8-12) wherein light having a wavelength within a selected range enters the device (entering 154a)),, is amplified by the amplifier (see Paragraph 0057, lines 11-13), and reflected by one of the mirrors (see Paragraph 0059, line 8), to exit the device in a direction controlled by the mirror (see Paragraph 0003, lines 8-9). Regarding Claim 2, Jin et al. teach (see Fig. 10) light amplified by the amplifier before

(using 154a)) and after (using 154b)) reflection by the mirror. Regarding Claim 4, Jin et al. teach the mirrors and the region above the mirrors contained in the substrate (see Fig. 2). Jin et al. do not teach the optical amplifier as solid-state or attached to the substrate or the mirror and moving with the mirror relative to the substrate. Walker et al. teach (see Fig. 3D) a device comprising at least one solid-state amplifier (300) attached to a mirror (320), wherein light having a wavelength within a selected range (entire E-M spectrum) enters (314) the device, is amplified by the amplifier, and is reflected by the mirror to exit (316) the device in a direction controlled by the mirror, wherein the light is amplified by the amplifier before and after reflection by the mirror (see Col. 6, lines 31-36), and wherein the amplifier is attached to the mirror and is always oriented in the direction of the mirror (since it is directly attached to the mirror). It would have been obvious to one of ordinary skill to replace the amplifier of Jin et al. with the solid-state optical amplifier attached to each mirror as taught by Walker et al. in the device of Jin et al., to integrate the amplification stage with the mirror to conserve space and provide integration for the components of the device using cheaper solid-state elements. Since the optical amplifier is directly attached on top of the mirror in Walker et al., the amplifier moves with the mirror when attached on top of the moveable mirrors of Jin et al., and since the amplifier resides in the region above the mirrors, the amplifier is contained in the substrate, as the substrate surrounds the mirrors and the region above the mirrors of Jin et al.

Applicant initially questions what is meant by the Office Action statement that "Jin et al. teach (see Figs 2 and 10) a device (20/158, 154a, 154b)." Is the Office Action calling the device element 20, element 158, element 154a or element 154b, all of which are different? For example, Jin et al. state, in paragraph [0059]:

> The tunable system 158 comprises a demultiplexer in combination with a tunable light-reflecting MEMS mirror device and a multiplexer to put together the different wavelength channels into the optical fiber.

Further confusion occurs due to the Office Action labeling "spring clips 24" as "a substrate," and then asserting "a plurality of mirrors (25) attached to *a substrate.*" Is this the same or a different substrate? It is not clear, for example, that Jin et al. teach that mirrors 25 are attached to spring clips 24.

Applicant acknowledges the Office Action statement that "Jin et al. do not teach the amplifier is solid-state or attached to the substrate or the mirror and moving with the mirror relative to the substrate."

Applicant respectfully disagrees, however, with the Office Action statement that "light...is reflected by the mirror to exit (316) the device in a direction controlled by the mirror." The mirror (320) of Walker et al. is stationary, and there is no teaching in Walker et al. that the mirror controls the direction that light is reflected.

Given the multitude of elements that are lacking from Jin et al. and Walker et al. compared to the claims at issue, it would have been surprising for one of ordinary skill to create the magic bullet proposed by the Office Action that attempts to provide all those missing elements, absent the teaching of the present invention.

Note that neither Jin et al. nor Walker et al. provide an incentive to make the combination proposed by the Office Action. Jin et al. states:

> One of the preferred uses of the device of FIG. 10 is to reduce spectral dependence in the gain output of an optical amplifier. For example, the characteristic gain spectrum of an erbium-doped optical fiber amplifier has a pair of gain peaks at about 1.53 .mu.m and at about 1.56 .mu.m. Thus, a signal at 1.53 .mu.m will be amplified more than one at 1.54 .mu.m, which would be disadvantageous in a wavelength division multiplexing (WDM) system.
>
> By properly demultiplexing the optical signal and sending to different light-reflecting mirrors for separately programmed attenuation of signal strengths, and by optional tuning of the mirror reflections via a feedback system, the gain spectrum of the amplifier device combination can be made substantially flat over a range of wavelengths.

The Office Action's proposed combination contradicts this preferred use. There is no indication in Walker et al. that the "tunable-gain VLSOA 300" of FIG. 3D suffers from a spectral dependence in its gain output. Thus one of ordinary skill in the art would not have been motivated to replace the fiber amplifiers 154a and 154b of Jin et al. with the VLSOA 300 of Walker et al. in the system 150 of Jin et al., because the resulting system would have been useless for Jin et al.'s preferred use.

Further, as discussed below, the combination proposed by the Office Action would not have functioned, absent additional modification taught by the present invention, and so one of ordinary skill in the art would have been dissuaded from making the proposed combination to create a nonfunctional device.

Applicant also respectfully disagrees with the incentives stated by the Office Action. The Office Action's asserted incentive "to integrate the amplification stage with

the mirror to conserve space and provide integration for the components of the device" is not found in either reference. A specific hint or suggestion in a particular reference is necessary to support a combination of references in an obviousness rejection. In re Lee, 61 USPQ2d, 1430, 1434 (Fed. Cir. 2002). Moreover, although Walker et al. claim that fiber amplifiers suffer from high cost, the Office Action proposes replacing the mirror of Jin et al. with the amplifier of Walker et al., and there is no indication in either of the references that the amplifier of Walker et al. is cheaper than the mirror of Jin et al. Even if the incentives proposed by the Office Action were taught by the references, they would have been outweighed by the disincentives mentioned above.

Assuming arguendo that the references would have been combined as proposed by the Office Action, the claims at issue are substantially different than and nonobvious over the proposed combined device.

For example, should the fiber amplifiers 154a and 154b of Jin et al. be replaced with the VLSOA 300 of Walker et al. in the system 150 of Jin et al., the amplifiers would not be attached to the substrate, in contrast to claim 1. Moreover, the system would not work, because the VLSOA 300 of FIG. 3D of Walker et al. reflects rather than transmits light, so the light would never reach the demultiplexor of Jin et al.'s system 150, but would instead be reflected backwards.

Should the mirrors 25 of Jin et al. be replaced with the VLSOA 300 of Walker et al. in the system 150 of Jin et al., the resulting device also would not work, absent the teaching of the present invention. For instance, how would the VLSOA 300 be pumped? Walker et al. does not teach how to pump VLSOA 300, other than the statement, in column 4, line 52: "The active region 304 is pumped." Jin et al. teaches, in paragraph 57: "The amplifiers are pumped by pump sources 155, 156, of optical energy of pump wavelengths λ_{p1} and λ_{p2}." How exactly such optical energy would be pumped into the VLSOA 300 array proposed by the Office Action is not clear, particularly because of the multitude of amplifiers 300 required for system 150 would appear to shadow each other from the pumped energy, as well as possibly reflect from the VLSOA 300 as erroneous signals. Should VLSOA 300 array instead somehow be electrically pumped, how exactly would the electrodes and leads be configured to allow movement of the amplifiers? Without the electrode and lead configuration taught by the present invention, the device

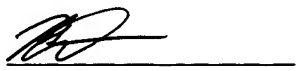
proposed by the Office Action would not have functioned, further demonstrating the nonobviousness of the present invention.

Finally note that mirror arrays have been known for many years. Solid state optical amplifiers have also been known for many years. And yet the two have not been combined as recited in the present claims. Should such a combination have been obvious, it would have already been made.

IV. Conclusion

Applicant has responded to each of the items of the Office Action, and has shown that the pending claims are not obvious over the cited references. As such, applicant respectfully asserts that the application is in condition for allowance, and a notice of allowance is solicited.

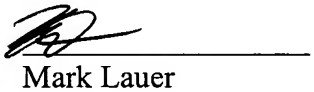
Respectfully submitted,



Mark Lauer
Reg. No. 36,578
6601 Koll Center Parkway
Suite 245
Pleasanton, CA 94566
Tel: (925) 484-9295
Fax: (925) 484-9291

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: MS No Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on April 14, 2004.

Date: 4-14-04 

Mark Lauer